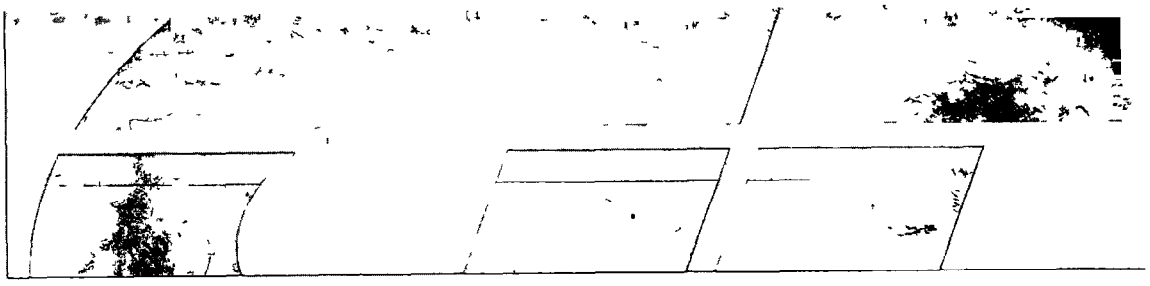

ARRB NEW ZEALAND

SAFETY AUDIT OF EXISTING ROADS

Review of Process Development and Initial Implementation

Report No. 95/434S

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SAFETY AUDITS OF EXISTING ROADS

REVIEW OF PROCESS DEVELOPMENT AND

INITIAL IMPLEMENTATION

Prepared By .....
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February 1996

PREFACE

This is a final report.

This report has been prepared for the purpose of assisting Transit New Zealand to discharge its statutory responsibilities in terms of the Transit New Zealand Act 1989 and to provide advice to the authorities concerned

This report provides a summary of current developments and practices in the field of the safety audit of existing roads. While the author has surveyed practices in New Zealand and worldwide, there is no guarantee that the survey is complete or current

As further work is done and more experience gained, the conclusions of this report and opinions expressed in it may change Readers of the report should not rely solely on its contents Readers should seek the most up to date information available.

SAFETY AUDITING OF EXISTING ROADS

REVIEW OF PROCESS DEVELOPMENT AND INITIAL IMPLEMENTATION

23 February 1996

Prepared For

Review & Audit Manager
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By

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SAFETY AUDITING OF EXISTING ROADS

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EXECUTIVE SUMMARY

Transit New Zealand (TNZ) developed and published Safety Audit Policy and Procedures in August 1993 These procedures were designed specifically for safety auditing of projects As the major part of the roading expenditure goes into maintaining the existing roads, there is an obvious need to ensure that safety is maintained throughout the whole network as well as on new projects

There are various techniques available for monitoring, improving and assessing the needs of safety on the total roading network None of these techniques include procedures which look objectively at the standards of road safety being achieved and maintained by road controlling authorities over their total roading networks Crash reduction studies, audits of compliance with specific standards and state highway safety management strategies have been progressively developed over the past decade and whilst these contribute to the overall improvement of the provision of safety elements of the roading network, there has not until recently been available a technique to undertake an audit of the end result

In 1994 TNZ had completed a review of existing practices associated with road safety both in New Zealand and overseas At that time the Australian states of Queensland and New South Wales had developed clear policies and procedures for undertaking formal audits of existing road networks

In early 1995 a trial using both the Queensland and New South Wales procedures was undertaken in Palmerston North, following which a decision was made to adapt the New South Wales procedures to suit New Zealand conditions as these appeared to be most able to be aligned to New Zealand conditions

A draft set of procedures for undertaking existing road audits in New Zealand was developed and they have now been used to assess the roading networks of seven road controlling authorities The procedures for auditing state highways and rural roads can now be used with confidence that they will provide consistent and factual reports The complexity of road safety in the urban situation has meant that the development of procedures for urban areas still requires further refinement

The findings of audits completed to date have generally identified the need for road controlling authorities to review their strategies for the provision of services such as edge delineation, directional signage, provision of flush medians and edge lines and the upgrading of traffic signals Once one of these audits has been completed, it is believed that a subsequent audit would be able to identify whether or not the particular road controlling authority had made any progress with addressing the previously identified deficiencies

This report sets out the background of the need for such auditing procedures, the investigation and development undertaken to date, and summarises findings from the seven audits which have been completed

It is proposed that these procedures be used by TNZ's Review and Audit Division for monitoring road safety of road controlling authorities as well as being made available to those authorities to use themselves to identify deficiencies within their networks

SAFETY AUDITING OF EXISTING ROADS

1. BACKGROUND

With the guidance of a working party, Transit New Zealand (TNZ) has developed and published its **Safety Audit Policy and Procedures** August 1993 At an early stage in the working party's deliberations, it was noted that the proposed policy applied to new projects only. As the major part of the roading expenditure goes into maintaining the existing roads, the question was raised, "*why not apply the same principles to existing roads?*" The working party decided to continue with the development of project oriented audits and return to the question of the existing roads audits at a later stage

There are a number of techniques in use or under development which might be considered to be safety audits of the existing network These include

- Crash Reduction Studies (CRS),
- Compliance with standards audits (refer joint TNZ/LTSA report 93/270T),
- TNZ Safety Management Strategies (SMS)

In order to avoid duplicating effort, the TNZ Safety Audit Manager commissioned John Hannah of Beca Carter Hollings & Ferner Ltd (BCHF) to undertake a review of existing practices in both New Zealand and overseas The report of that review is TNZ Review and Audit Division Report No 94/339S

The report noted -

> *"Two Australian states (Queensland and New South Wales) have developed very clear policies and procedures for undertaking formal audits on existing road networks"*

Based on these findings, a trialing of both the New South Wales Road and Traffic Authority (RTA) and Queensland procedures was undertaken in February 1995 and reported in TNZ Review and Audit Division Report No 94/3805

As a result of this review, the New South Wales procedures were further investigated by obtaining first hand experience of an audit in practice in New South Wales following which a first draft set of procedures was developed for piloting in New Zealand

Since the development of the initial draft procedures, four pilot audits have been completed, the procedures reviewed and updated and then used on three more formal audits

2. PURPOSE

The purpose of this report is to summarise in one document the background information and philosophy which has led to the instigation of the procedures

The report also reviews the experiences to date from the seven audits which have been completed, as well as identifying the future role of this process within TNZ's overall objective to

> "***Promote policies and allocate resources to achieve a safe and efficient land transport system that maximises national economic and social benefits.***"

3. LITERATURE REVIEW

As a first step in identifying the process by which safety audits of existing roads could be undertaken, TNZ commissioned BCHF to undertake a review of both International and New Zealand practices, and to develop an initial checklist and/or methodology which could be used for undertaking such audits

The findings of both investigations are summarised as follows

3.1 OVERSEAS PRACTICES

Three English counties (Oxfordshire, Berkshire and Hampshire) have developed a methodology for auditing existing roads which is effectively an extension of the existing Institute of Highways and Transport (IHT) procedures for auditing of projects These procedures were being applied by maintenance contractors or consultants, and in many ways were similar to the procedures initially developed in New Zealand for Safety Management Strategies (SMS)

In Australia, two states (Queensland and New South Wales) had developed specific procedures and policies for the undertaking of formal audits on existing road networks The procedures developed by both of these authorities had established guidelines for the membership of the audit team, audit procedures and tested checklists A key feature of these procedures was that the audit team was independent from the staff involved in the day to day management of the network

3.2 NEW ZEALAND PRACTICES

The following is a summary of New Zealand practices In some ways they do address the ongoing auditing of traffic service facilities on existing roading networks but do not use systematic checklists

3.2.1 TNZ Technical Audit Reviews

As part of the TNZ Audit and Review Division's regular activities, a review and audit of both practices and procedures of road controlling authorities is undertaken by an independent team The review generally takes place over a two to three day period and includes the examination of management procedures and practices and a full range of roading maintenance and construction activities Included is a general inspection of a sample of the roading authority's network This does not appear to be targeted at any particular items or moulded around a declared checklist and does not specifically target traffic services facilities and road safety These features may be noted when there is something particularly significant

3.2.2 Crash Reduction Studies

Since the implementation of Crash Reduction Studies (CRS - previously Accident Investigation Studies (AIS)) in 1985, variations to those established procedures have been instigated, particularly by some TNZ regional offices The CRS procedures as such do not undertake any review or audit of traffic services facilities throughout the roading network as they specifically target sites with known accident records In some TNZ regions where CRS procedures have been superseded by SMS, these strategies sometimes include a detailed examination of the total roading network traffic services (Details of these procedures are given in 3 2 4 below)

3.2.3 Joint LTSA/TNZ Audits Of Compliance with Road & Traffic Guidelines

TNZ's Review and Audit Division joined with the Land Transport Safety Authority (LTSA) in undertaking detailed audits of roading authorities' compliance with the various guidelines

From observation of one audit undertaken by the LTSA on its own and one joint audit, it appeared that the prime purpose of these is to examine in detail the application of specific guidelines In the case of one audit this included one-way bridge control and advisory signage and edge marker posts only (TNZ Review and Audit Division Report No 93/276/6/T)

The focus of these audits is extremely narrow and appears to concentrate only on the specific details of the particular guidelines upon which the application is being audited Whilst this, in itself, may be useful, it falls far short of providing a broad perspective view of the safety facilities of the roading network To ensure that the matrix of traffic service facilities gives a clear and interpretable message as to the hazards and driving conditions which prevail, a much broader view of the traffic safety aspects of the roading network is necessary

3.2.4 Safety Management Strategies/Accident Monitoring

Several TNZ regional offices have developed procedures for ongoing monitoring of accidents and traffic services facilities maintenance on their state highway's networks These procedures were detailed in a recent report (TNZ Review and Audit Division Report No 94/330S) There are now several versions of these procedures which vary significantly throughout TNZ regions and do not generally include any formal checklists Safety management strategies are being progressively developed Safety inspections have now been integrated into TNZ's standard SMS specifications

The accident monitoring system operated by the TNZ Auckland region and about to commence in the Bay of Plenty covers the SH network The key emphasis is placed on the identification of accident sites old and new, and any improvements which may be made to those sites specifically to address those accidents The system does not appear to look generally at the appropriateness of the level of traffic services and level of maintenance of those services within the network

3.3 RECENT DEVELOPMENTS

Since conducting the investigations into both overseas and New Zealand practices, various developments have occurred In addition to various enhancements to the safety management strategies in New Zealand, Vic Roads (Victorian State Roads Authority) has completed the development of procedures for auditing existing roads These procedures appear to be similar to the New South Wales procedures and the resultant reports identify safety issues in a fairly detailed format

3.4 CONCLUSION

The conclusion which was reached from these investigations in November 1994 was that the procedures adopted by Queensland or New South Wales were the only ones which had been developed to consciously audit traffic services and road safety on existing roads Further investigation of those systems should be made by way of trialing them on different levels of both state highway and local roading networks Work being completed in the United Kingdom was less targeted and appeared to be still under development

4. NEW ZEALAND TRIAL OF QUEENSLAND AND NEW SOUTH WALES PROCEDURES

In February 1995, the opportunity was taken following the IPENZ Conference in Palmerston North to trial both the Queensland and New South Wales procedures

Dr Appleton (Safety Audit Manager TNZ) arranged for five engineers representing local authorities, Transit New Zealand and consultants to take part in the review and trialing of those procedures Mr John Hannah of BCHF was appointed by TNZ to act as Project Leader and report presenter

The review and trialing was undertaken over a three day period The majority of the first day was taken by Fred Schnerring (Roads and Traffic Authority New South Wales (RTA)) and Gordon Lee (Department of Transport, Queensland) to give background and present their respective safety audit procedures During the late afternoon and evening of the first day, all of the second day and half of the third day, road inspections were undertaken using each of the procedures in different situations The types of roads inspected included state highways, rural local roads, urban arterial/state highways and minor urban roading

During the afternoon of the third day, there was a general discussion between all parties to review the impressions of procedures and agree upon future options

It is important to note that no attempt was made to complete any formal audits of the first road sections inspected

4.1 FINDINGS

4.1.1 Procedures

The Queensland and New South Wales full procedures were very similar, although the layout and terminology of the checksheets varied

Both procedure checklists were found to be very comprehensive Perhaps due to the unfamiliarity of the team members, the procedures were found to be a little tedious, particularly on the longer sections of highway Two persons plus a driver could manage these procedures, although depending on complexity of the highway, progress could be slow

Although the checklists provide an excellent prompt to auditors, it was found to be important that they have the skills and focus to identify any other safety issues

The checklists were in the form of tables with check boxes for each aspect/kilometre and could be easily managed by two auditors plus a driver Typically they would cover 20-30 km in each direction at normal travelling speed The team then reviews their findings before returning for detailed inspections of particular items These simplified procedures could be used to provide a "global" overview/audit of a network The detailed full procedures could be used either as a follow-up for specific sites or shorter lengths of road identified as having problems

4.1.2 Inspection Observations

All three types of procedures (RTA and Queensland Full and RTA's Simplified) identified numerous items of road signage, delineation, road and shoulder shape, geometry etc which required attention This left all team members convinced of the need for such a process

Each of the procedures required similar skills to those required for TNZ's current safety auditing of projects, although existing road situations often involve elements of design which were developed with now obsolete standards and guidelines and consequently more "judgement" is required

All present agreed that there were sufficient competent Safety Engineers with project auditing experience who could, with additional training, undertake safety auditing of existing roads using procedures similar to those trialed with preference given to RTA's simplified format

Often there was a conflict between what team members considered were appropriate highway requirements and what the actual standards and guidelines recommended Experience may result in recommendations for some amendments to those standards and guidelines If encouraged this could lead to improvements, provided they are based on sound judgement and reasoning

All involved agreed that the "Auditors" must be independent of direct involvement with the control and management of the section of highway being audited

4.1.3 General Comments

To date there was no systematic auditing of existing roads in place in Queensland Most of the audits had been carried out as a result of safety concerns indicated by crash records and/or expressed by the community NSW commenced auditing existing roads in response to problems on the Pacific Highway following several serious crashes in 1989 They have subsequently used the process for all state roads and have a goal to audit all roads once every five years

Existing maintenance inspections, as part of the SMS in New Zealand, target detailed maintenance items as well as an overview of general safety, and mostly involve personnel involved in day to day network management, albeit from adjacent areas or regions This does not have the independence and broad safety focus of the proposed audit process Some regions have more recently modified the SMS Proforma to include a more general safety inspection with a greater level of independence

Neither of the Australian States had attempted to use the process on a sample of the network and then apply the general findings across the total network length

As auditing of existing roads had only been operating in NSW and Queensland for a short time, no monitoring of responses to audits had been undertaken NSW is aiming to completely audit its total network every five years, and monitoring will automatically happen as part of the second round audits

4.2 CONCLUSION FROM NSW & QUEENSLAND TRIALS

As a result of this brief introduction to the Queensland and New South Wales procedures, it was concluded that to enable a systematic development of safety auditing of existing roads to be undertaken in New Zealand, it was first necessary to adapt and amend procedures to suit New Zealand conditions The RTA of NSW procedures for both long distance and short length detailed audits provided the best basic format upon which to develop these New Zealand procedures

It was concluded that the best way of undertaking this adaptation would be firstly for arrangements to be made to observe an audit undertaken by the RTA, following which in conjunction with other personnel from New Zealand, a first draft of New Zealand procedures could be developed

Arrangements were made for Mr Hannah (BCHF) to be an observer of an audit in New South Wales and then, in conjunction with Mr Colin Brodie (Works Consultancy Services) who has also had some experience with the RTA procedures, to jointly prepare a first set of procedures which could be used for undertaking pilot audits

5. OBSERVATION OF NEW SOUTH WALES PROCEDURES

The observation by Mr Hannah was of an audit undertaken in the western region of New South Wales in early May 1995 The audit was led by Mr Tim Reardon of Sinclair Knight Merz Consultants, under a brief prepared by the RTA's western region It is important to note that this brief required modification to the procedures prescribed in the RTA's safety audit procedures for existing roads These modifications resulted in a requirement for a large amount of detailed infrastructural deficiency data to be collected This quantity of detail significantly affected the degree of concentration placed on the road safety environment by the audit team

The composition of the audit team also did not comply with the RTA procedures, and comprised the team leader who was independent, in conjunction with the local regional RTA safety officer and the RTA maintenance foreman

As a result of the requirement for collection of large amounts of infrastructural data upon which the team leader had to report, he undertook all of the recording This resulted in the level of attention able to be paid by the team leader to the general safety aspects of the roads being audited being restricted

Although a copy of the audit report for that audit has not been made available to TNZ, the following general conclusions were reached as a result of observing this audit

- Do NOT modify the procedures
- The independence of the audit team (or at least two of its members) is imperative
- Training of all parties, both auditors and asset managers in the procedures and their objectives is vital
- The process should not be used as an opportunity to undertake other highway data collection or management functions

The opportunity for observation was valuable from the point of view of experiencing the practical use of the audit check sheets

6. DRAFT PROCEDURES FOR NEW ZEALAND

Based on the experiences of Messrs Hannah and Brodie, they concluded the adaptation of the RTA procedures and guidelines using a similar format to the existing TNZ project safety audit procedures A most useful inclusion in the guidelines is a priority ranking system to give some guidance to the road controlling authority as to the priority order in which the recommendations of the audit should be instigated The risk level ranking ranges through urgent, high risk, medium risk to low risk, derived from a matrix of the probability of a crash versus the predicted severity of that crash

The latest draft (January 1996) of these procedures is available on request

The procedures give guidance to the composition of the audit team, selection of roads and the method by which the audit inspections are undertaken

The significant modifications to the first draft of the procedures have been associated with the checksheets There has now been a total of approximately 20 people involved in undertaking these audits in New Zealand, and although there is some degree of acceptance of the current format of checksheets, these could be modified further with more experience The development of the checksheets of the urban situation has proved to be more difficult, and it is this one which still requires significant work

7. COMPLETED NEW ZEALAND AUDITS

Between May and September 1995, a total of seven audits of existing roads were completed The first four of these audits were deemed to be "pilots" with the latter three being deemed to be "real" The following table summarises those audits and the personnel involved (Underlined team members were Client's representatives)

				Number of Features Noted				
Roading Authority	**Date 1995**	**Length of Roads Audited (approx)**	**Type of Road**	**Urgent**	**High**	**Med**	**Low**	**Team Members (Dr Appleton in all Teams)**
Tararua District Council	10 to 12 May	205 km	Rural ranging from Local to Arterial	1	5	12	3	John Hannah Tony Francis Kailash Mehrotra
Transit NZ Wanganui Manawatu	24 to 26 May	150 km	State highways	5	3	89	5	John Hannah Colin Brodie Evan Chadfield
Palmerston North City	12 to 14 June	70 km	SHs urban and local urban arterial collector and local and rural local	--	17	31	3	John Hannah Stephen Hewett Glenn Connelly
Transit NZ Christchurch	26 to 28 June	150 km	Urban and rural SHs	--	11	16	9	John Hannah Andrew Ferguson Marten Oppenhuis
Banks Peninsula District Council	28 Aug to 1 Sept	87 km	Rural ranging from local to arterial	-	8	8	6	Tony Francis Mike Gadd Gerrard Burgess (part time) Quintin Blackburn
Tasman District	25 to 28 Sept	139 km	Urban and rural arterials and collectors	--	10	32	29	Colin Brodie Evan Chadfield Chandra Wattage
Kapiti Coast District Council	17 to 20 Sept	70 km	Urban arterial collector and local roads and rural local	--	25	41	3	Stephen Hewett John Hannah Angie Crafer Geoff Strand

7.1 AUDIT PROCEDURES

For each of the audits, the draft procedures were generally followed In most situations, the audit commenced on the first morning with a briefing, setting out the steps which have been taken to arrive at the development and trialing of these audits, along with a detailed description of the process The selection of roads to be audited was made by the independent members of the audit team who attempted to ensure that a representative sample of road types within the district was covered

On each occasion, some time was required by the "new" team members to master the techniques for using the checksheets The format of checksheets as has previously been identified is one item which requires further work There would almost be as many checksheet formats suggested as there have been auditors involved to date, although most have been able to successfully use those provided

In most situations, the team was able to make good use of the checksheets for rural areas, but in the urban environment, these have proved to be extremely difficult to manage During later audits of urban areas, some degree of confidence in the use of revised checksheets and auditing process was being developed Further work and experience is necessary before a significant degree of confidence can be achieved that audits of urban areas would be independent of the particular views of prospective auditors, and hence provide uniform application and interpretation

7.2 AUDIT PROGRAMME

As described above, the opening meeting for the audit team is used to provide an opportunity to background the process, particularly introducing the representative of the road controlling authority to the aims and objectives

Upon the completion of the introductory session, the audit teams undertake the site inspections in accordance with the procedures, involving daytime inspections in both directions, progressively working along a section of highway or through an urban area The same sections of road are audited again at night These night inspections often provided confirmation of deficiencies noted during the daytime as well as providing the only opportunity for judgements to be made in respect of the appropriateness of the levels of delineation and/or lighting provided Night-time inspections seldom involve detailed analysis of individual sites

At the commencement of the second day of the audit, it is imperative that the team takes sufficient time to thoroughly review all of the notes from the previous day and to prepare the first draft for the report for those sections of road audited Failure to undertake this before commencing on the next day's audit results in the audit team becoming confused between the many sites and features noted

Following the completion of the preparation of the first draft for the previous day's audit, the team then departs for the inspections of the roads to be audited on that day and follows a similar procedure to that of the first day

All of the audits undertaken to date have been conducted over three days This has resulted in the roads inspected on the third day not being subject to a night-time audit

At the conclusion of the third day's activities, time is taken for the audit team to present a verbal report at a closing meeting to the road controlling authority, as well as discuss the audit process and make suggestions for improvements or comments on the process

For future audits this programme could be reviewed to consider extending the audit to include a night inspection of the third day's inspection lengths with the review and report preparation being completed on the fourth day

From the experience to date, it is firmly believed that audits should be conducted over a maximum of three days, and that in rural situations up to a maximum of 100 km of highway is able to be audited on the first two days, whilst on the morning of the third day only a limited section possibly adjacent to an urban area is appropriate for inspection As the auditing process involves driving each sub-section (route station to route station 15 to 20 km) in three directions during the day time and in two directions at night, this involves the audit team in approximately 500 km of travel per day Within urban areas travel distances are not as great but the mass of data and implications on road safety, because of the more dense population and road use, require similar maximum time frames

Experiences also show that the night time audits can be undertaken very effectively having one person in the back of the car recording onto a dictaphone comments regarding the inadequacies of delineation etc made by the driver, with the front seat passenger recording the route position

7.3 THE PLACE OF CRASH DATA

Auditors involved to date have had varying views on the benefits or otherwise of having available for consideration the crash records of the roads to be audited If these crash records are to be reviewed in any way, it becomes necessary for a decision to be made before the audit team meet as to which roads are to be audited, so that the data can be made available

There is a firmly held view that safety auditing of existing roads must not be lulled into some of the processes involved in crash reduction studies Whilst this view is acknowledged, some members of audit teams have felt there to be significant benefit to have areas or sections of highway with particular crash problems identified prior to visiting the site, as this information helps them focus towards potential problems

7.4 AUDIT FINDINGS

The preceding table (see 7) gives an indication of the number of items requiring attention which were identified under the various priority rankings

From the audits completed to date it is noted that although the inspections have only been of a sample of roads, the findings can, in principle be repeated throughout the network The following is a summary of these features

REPEATABLE FEATURES	
Road Authority	**Repeatable**
Manawatu State Highways	Edge delineation, poor road marking
Palmerston North City	Inconsistent use of flush medians and edgelines, signals requiring upgrading
Canterbury State Highways	Directional signage, side road control
Tararua District	Long term strategies required for edge delineation, curve warning signs, guard-railing and road name signage
Kapiti Coast	Inconsistent use of flush medians and edge lines
Banks Peninsula District	Guard-railing, inconsistent lighting and side road control
Tasman District	Inconsistent delineation (edge marker posts, RRPM's), side road control and poor intersection conspicuity

In general the audits completed to date have only identified a limited number of what is deemed to be urgent safety problems The dominating theme has been to recommend that the road controlling authority develop a medium term policy for the provision of a standard approach and programmed implementation of traffic services such as edge delineation, directional signage, curve warning signage, flush medians and edgelines and in some cases guardrailing The audit process having identified these inadequacies within the roading network has therefore provided an excellent base upon which a subsequent audit would be able to monitor whether that particular road controlling authority has made any progress in remedying these inadequacies

The audits have identified various items where either no appropriate standards exist or the existing standards appear to be inappropriate or out of date and require revision

In particular, there appears to be a lack of guidance and direction for road controlling authorities pertaining to the application of flush medians, edge lines, lane widths, and side road control within urban roading networks TNZ's Signs and Markings Manual, whilst giving good guidance for the standards to be used in various situations, does not give any guidance as to when or where they should be installed In the rural scene there has been lengthy debate regarding the lack of clear guidance as to when guardrailing should or should not be provided

8. GENERAL OBSERVATIONS

The following items set out general observations in respect to the practice of safety auditing, its benefits, uses, team composition and report format

8.1 USE OF THE PROCESS

The process of safety auditing of existing roads can be used successfully for two purposes

(a) The process provides a tool for Transit New Zealand's Review & Audit Division to undertake an audit of a road controlling authority from which it is able to make judgements both on an individual and a comparative basis of the standards and level of services being provided by that particular road controlling authority in respect to traffic services and road safety

(b) The process can also be used by a road controlling authority to assist it to identify the adequacies or otherwise of its traffic services and level of road safety From the findings of an audit they would be able to develop medium and long term programmes for the upgrading of traffic and safety related services

8.2 BENEFIT TO THE ROAD CONTROLLING AUTHORITIES

By having an independent team of safety experts undertake an audit of the roading network, those authorities will be provided with a report which will assist them in determining the adequacy of the roading network in respect to the traffic services and road safety This will identify needs for both medium and long term planning, as well as providing to some degree a measure of the competence in respect to traffic services and road safety being provided to them by their network managers

8.3 SAFETY AUDITING OF EXISTING ROADS vs SAFETY INSPECTIONS

There continues to be discussion with respect to these two functions When safety inspections were first introduced by the Christchurch region of TNZ they clearly concentrated on a large number of detailed maintenance items which were subject to a very rigorous inspection and recording process More recently some TNZ regions (e g Waikato) have extended their professional services brief for SMS to include a process similar to safety auditing of existing roads SMS also include activities in addition to safety inspections pertaining to the general maintenance of the network

Whilst the development of most SMS's require the involvement of an independent person for some of the regular inspections, they are often not truly independent and therefore run the risk of not seeing "the obvious" inadequacies with which the inspectors have become particularly familiar

8.4 HAZARD RATING

The use of the hazard rating matrix as described in this report provides the road controlling authority with a basis upon which it can prioritise improvements to its network Whilst the hazard rating is derived from a matrix which requires subjective judgements, if those judgements are made by the independent audit team they can be seen as sound and balanced

8.5 REPORT FORMAT

Safety Audit reports have to date been completed in various formats in an attempt to settle upon the most appropriate and useful format for future work

The auditing process identifies two types of deficiencies, one the maintenance deficiency and two the application of standards and general items

To date the reports have been written in two ways One with the maintenance deficiencies separated from the standards across all of the road audited and two, on a route by route basis

The first method (maintenance deficiencies and standards across the network) provides a road controlling authority with an overall view of its total roading network from which it is able to make strategic decisions for improvements The second method provides a road controlling authority with a simple list on a route basis which could be passed onto a network consultant and /or contractor to arrange for the remedial works

The inclusion of photographs into the report is important as it assists readers unfamiliar with the roading network to gain a clear understanding of the identified deficiencies and problems These photographs should be included within the text of the report and not attached as a separate appendix as they then require the reader to flick backwards and forwards between the text and the referred photographs

For future audits it may be appropriate that when the audit is being undertaken for the Review and Audit Division of TNZ, the report be prepared on a network wide basis However, when a road controlling authority has the audit undertaken for its own purposes, that report may then be more appropriately prepared on a route by route basis and thus provide a document that can be separated and targeted to the specific routes for remedial works

8.6 AUDIT TEAM COMPOSITION

Independence of the majority of the audit team is paramount to achieving an audit of the network which is free from local interpretations and emphasis

It is also important that auditors be chosen from personnel with a wide range of experience in road safety and network management and be unencumbered by personal agendas and/or interpretations As audit teams will face a very wide range of road environments, the emphasis of auditors having significant experience and expertise across a wide range of road types is important.

For an audit team to function satisfactorily and effectively there needs to be a minimum of three personnel involved It is recommended that the third personnel in the audit team be from the network management staff and although this person obviously does not bring any level of independence to the audit process they are able to assist with any local knowledge requirements and provide information pertaining to any questions which may be raised relating to local interpretations

If available, it is also beneficial for a representative of the road controlling authority to be present for at least part of the audit and the opening and closing meetings to obtain the benefit of knowledge regarding the audit process and the general findings of the auditors

8.7 AUDITOR/CLIENT RELATIONSHIP

As noted in 8 6 above there is a benefit for a representative of the road controlling authority (Client) to be involved during the Audit Whilst the audit essentially looks for deficiencies in the roading network it is important that good features are also noted so the Client does not view the ultimate report as totally negative This will enhance the possibility of adoption and the recommendations

9. FUTURE DEVELOPMENT AND USE OF THE PROCESS

The process of safety auditing of existing roads has now been developed to a stage where it can be very confidently used for rural roads There is still work to be done in refining the way urban audits are completed, as well as determining the best format for presentation of the reports The particular emphasis of individual auditors tends to influence the findings, although as experience is gained and more people become involved, this problem should diminish

This process has primarily been developed to enable the Safety Audit Manager of TNZ's Review and Audit Division to assess the performance of Road Controlling Authorities (RCA's) and measure progress over time It can also be successfully used directly by RCA's to check the standard and consistency of road safety in their areas From the audit findings, medium to long term strategies can also be developed With such strategies in place, any upgrading or maintenance works can then be completed to the appropriate standard, thereby progressively upgrading safety without major targeted expenditure, although for some tasks this may be necessary

10. RECOMMENDATIONS

(a) That Transit New Zealand confirm the use of Safety Auditing of Existing Roads Procedures as a process to be used by its Review and Audit Division to monitor Road Controlling Authorities Road Safety Performance

(b) That the Review and Audit Division develop a programme to undertake safety audits of existing roads on a sample of road controlling authorities' roads on a regular basis

(c) That the Safety Audit of Existing Roads procedures continue to be developed, particularly for the urban situation.

(d) That the Safety Audit of Existing Roads procedures be made available to Road Controlling Authorities to use as part of their road management package

(e) That the Review and Audit Division in conjunction with the State Highway Management Division arrange a workshop or workshops to bring together their safety auditors and safety inspectors to share experiences and opinions

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